

## Alanine, Glycine and Proline Contents of Casein and its Components<sup>1</sup>

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In a previous paper<sup>2</sup> on the amino acid composition of casein,  $\alpha$ -casein and  $\beta$ -casein, alanine analyses were listed as provisional. We wish now to record results of more accurate alanine determinations as well as revised figures for glycine and proline. The present analyses were made by the radioisotope derivative technique of Keston, Udenfriend and Cannan,<sup>3</sup> a method both highly specific and accurate.  $\gamma$ -Casein, a third component of casein, recently isolated in this laboratory<sup>4</sup> has also been analyzed for these amino acids. Average results (corrected for moisture and true ash) of triplicate analyses, shown in the table are believed to be more accurate than our previously published figures. The values for whole casein are now in closer agreement with reliable figures in the literature (alanine, 3.5%<sup>5</sup>; glycine, 1.9%<sup>6</sup>; and proline, 10.5%<sup>7</sup>).

	Alanine	Glycine	Proline
	G./100 g. protein		
Whole casein	3.20	2.00	10.6
$\alpha$ -Casein	3.81	2.26	7.47
$\beta$ -Casein	1.99	1.56	15.1
$\gamma$ -Casein	2.29	1.48	17.0

The radioisotope derivative technique was used also for determination of hydroxyproline in protein hydrolyzates according to the method of Keston,<sup>8</sup> *et al.*, and showed that whole casein contains less than 0.1% of this amino acid.

(1) These analyses are included in a thesis submitted by M. Bender to the Graduate School of Georgetown University in partial fulfillment of the requirements for the degree of Doctor of Philosophy. Article not copyrighted.

(2) Gordon, Semmett, Cable and Morris, *THIS JOURNAL*, **71**, 3293 (1949).

(3) (a) Keston, Udenfriend and Cannan, *ibid.*, **71**, 249 (1949).

(b) The I<sup>141</sup> used in this investigation was supplied by Carbide and Carbon Chemicals Corp., Oak Ridge National Laboratory, on allocation from the Isotopes Division, U. S. Atomic Energy Commission.

(4) Hipp, Groves, Custer and McMeekin, Am. Chem. Soc., Philadelphia meeting, April, 1950.

(5) Tristram, *Biochem. J.*, **40**, 721 (1946).

(6) Shankman, Camien and Dunn, *J. Biol. Chem.*, **168**, 51 (1947).

(7) Dunn, McClure and Merrifield, *ibid.*, **179**, 11 (1949).

(8) Keston, Udenfriend, Levy and Cannan, personal communication.

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